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The invention in which an exclusive right is claimed is defined by the following:

1. A contactless electrical energy transfer apparatus comprising:

(a) a portable receiving unit including:

(i) a receiver coil; and

(ii) a housing in which the receiver coil is disposed, said housing supporting the receiver coil; and

(b) a flux generator including:

(i) a housing adapted to be disposed proximate to the housing of the receiving unit;

(ii) a magnetic field generator comprising at least one permanent magnet disposed within the housing of the flux generator; and

(iii) a prime mover drivingly coupled to an element of the magnetic field generator, causing said element of the magnetic field generator to move relative to the receiver coil, movement of said element of the magnetic field generator producing a varying magnetic field that is coupled to the core of the receiver coil, inducing an electrical current to flow in the receiver coil.

2. The energy transfer apparatus of Claim 1, wherein the receiver coil includes a core formed of a magnetically permeable material.

3. The energy transfer apparatus of Claim 1, wherein the prime mover is disposed within the housing of the flux generator.

4. The energy transfer apparatus of Claim 1, wherein the prime mover comprises an electric motor.

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5. The energy transfer apparatus of Claim 1, wherein the prime mover is disposed outside the housing of the magnetic field generator and is drivingly coupled to said element of the magnetic field generator through a driven shaft.

6. The energy transfer apparatus of Claim 1, wherein said at least one permanent magnet is mounted on the element that is moved by the prime mover.

7. The energy transfer apparatus of Claim 1, wherein said at least one permanent magnet comprises a rare earth alloy.

8. The energy transfer apparatus of Claim 1, wherein the magnetic field generator includes a plurality of permanent magnets and a movable support on which the plurality of permanent magnets are mounted, said prime mover causing the support to move, thereby varying the magnetic field along a path that includes the receiver coil.

9. The energy transfer apparatus of Claim 8, wherein the support is caused to move reciprocally back and forth in a reciprocating motion.

10. The energy transfer apparatus of Claim 1, wherein the element of the magnetic field generator that is drivingly coupled to the prime mover comprises a magnetic flux shunt that is moved by the prime mover, to periodically shunt a magnetic field produced by said at least one permanent magnet of the magnetic field generator, causing the magnetic field to vary along a path that includes the receiver coil.

11. The energy transfer apparatus of Claim 1, further comprising an adjustment member that is selectively actuatable to change a maximum magnetic flux that is coupled to the core of the receiver coil.

12. The energy transfer apparatus of Claim 11, wherein the adjustment member controls a speed with which the element of the magnetic field generator is moved.

13. The energy transfer apparatus of Claim 1, wherein the magnetic field generator includes a plurality of permanent magnets mounted to the element at radially spaced-apart points around a central axis, enabling the varying magnetic field produced by magnetic field generator to couple with a plurality of different size receiver coils.

14. The energy transfer apparatus of Claim 13, wherein the prime mover rotates the element and the plurality of permanent magnets about the central axis.

15. A contactless electrical energy transfer apparatus adapted to couple magnetic energy into a portable device, comprising:

(a) a housing having a shape enabling the contactless electrical energy transfer apparatus to be disposed proximate a magnetic energy receiving portion of the portable device;

(b) a prime mover; and

(c) a magnetic field generator that is disposed within the housing, said magnetic field generator comprising a permanent magnet and including an element that is moved by the prime mover, causing a varying magnetic field to be produced that is adapted to transfer energy into the magnetic energy-receiving portion of the portable device.

16. A contactless electrical energy transfer apparatus comprising:

(a) a portable device including:

(i) a receiver coil; and

(ii) a housing in which the receiver coil is disposed; and

(b) a flux generator including:

(i) a housing adapted to be positioned proximate to the housing for the receiver coil;

(ii) a magnetic field generator disposed within the housing for the flux generator and comprising at least one permanent magnet and a flux shunt, said at least one permanent magnet being fixed relative to the receiver coil; and

(iii) a prime mover that is drivingly coupled to said flux shunt, said flux shunt being thereby caused by the prime mover to intermittently pass adjacent to pole faces of said at least one permanent magnet so as to provide a magnetic flux shunt path between the pole faces, thereby varying a magnetic field coupled with the core of the receiver coil to induce an electrical current to flow in the receiver coil.

17. The energy transfer apparatus of Claim 16, wherein the receiver coil includes a core formed of a magnetically permeable material.

18. A contactless electrical energy transfer apparatus adapted to transfer magnetic energy into a receiver coil within a portable device, comprising:

(a) a housing adapted to be positioned proximate to a magnetic field receiving portion of the portable device;

(b) a magnetic field generator disposed within the housing, said magnetic field generator including a permanent magnet having opposite pole faces, and a flux shunt that is movably mounted within the housing;

(c) a prime mover that is drivingly coupled to the flux shunt, to cause the flux shunt to move, movement of said flux shunt by the prime mover causing the flux shunt to intermittently pass adjacent to the opposite pole faces of said permanent magnet so as to provide a magnetic flux shunt path between the pole faces, thereby varying a magnetic field that is coupled with the magnetic field receiving portion of the portable device, to transfer magnetic energy to the portable device.

19. The energy transfer apparatus of Claim 18, wherein the flux shunt comprises a bar of magnetically permeable material that includes arms extending over the opposite pole faces of the permanent magnet.

20. The energy transfer apparatus of Claim 18, wherein the magnetic field generator includes a plurality of permanent magnets, and a fixed flux linkage bar coupling magnetic flux between different pole faces of the plurality of permanent magnets, said flux shunt periodically being moved over opposite pole faces of the plurality of permanent magnets to produce the varying magnetic field that is coupled with the magnetic field receiving portion of the portable device.

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21. A contactless battery charging/energy transfer apparatus comprising:

(a) a flux generating base unit comprising:

(i) an electric motor having a drive shaft;

(ii) a rotor, operatively coupled to the drive shaft of the electric motor to be rotated thereby and having attached thereto a plurality of permanent magnets, each permanent magnet having a north pole face and a south pole face oriented generally parallel to a rotational plane of the rotor; and

(iii) a housing in which the electric motor and rotor are disposed, a surface of the housing defining a contactless mounting interface;

(b) a receiving unit that includes an electrical energy-consuming load and further comprises:

(i) a receiver coil having a core formed of a magnetically permeable material and an electrically conductive winding around the core; and

(ii) a housing in which the receiver coil is disposed and supported, a surface of said housing adjacent to the receiver coil being adapted to be placed proximate the contactless mounting interface of the housing of the flux generator base unit; and

(c) a conditioning circuit electrically connected to the winding of the receiver coil, wherein a rotation of the rotor by the electric motor causes the receiver coil to experience a varying magnetic field, inducing an electrical current to flow in said winding, said electrical current being conditioned by the conditioning circuit for use in supplying electrical energy to the load.

22. The contactless battery charging/energy transfer apparatus of Claim 21, wherein the load in the receiving unit comprises a rechargeable storage battery.

23. The contactless battery charging/energy transfer apparatus of Claim 21, wherein the housing of the receiving unit is sized and shaped to mate with the contactless mounting interface of the flux generator base unit.

24. The contactless battery charging/energy transfer apparatus of Claim 23, further comprising a sensor that produces a signal indicative of whether the housing of the receiving unit is properly mated with the contactless mounting interface of the flux-generating base unit.

25. The contactless battery charging/energy transfer apparatus of Claim 24, wherein the sensor comprises one of a Hall-effect sensor and a reed switch disposed within the housing of the flux generator base unit, the signal being produced by the sensor in response to a magnetic field produced by a permanent magnet disposed within the housing of the receiving unit when the housing of the receiving unit is properly mated with the contactless mounting interface of the flux-generating base unit.

26. The contactless battery charging/energy transfer apparatus of Claim 24, wherein the electric motor is energized in response to the signal produced by the sensor, so that the rotor only rotates when the housing of the receiving unit is properly mated with the contactless mounting interface of the flux-generating base unit.

27. The contactless battery charging/energy transfer apparatus of Claim 22, further comprising an indicator that indicates when the rechargeable storage battery connected to the output of the conditioning circuit is fully charged.

28. The contactless battery charging/energy transfer apparatus of Claim 22, wherein the conditioning circuit in the receiving unit detects when the battery connected to the output of the conditioning circuit is fully charged and reduces the current supplied to the battery upon detecting such a condition.

29. The contactless battery charging/energy transfer apparatus of Claim 22, wherein the flux generator base unit comprises a sensor for determining when a battery connected to the output of the conditioning circuit is fully charged, and upon detecting such a condition, causes the electric motor to be de-energized.

30. The contactless battery charging/energy transfer apparatus of Claim 21, wherein the plurality of permanent magnets are disposed at different radii from a center of the rotor.

31. The contactless battery charging/energy transfer apparatus of Claim 21, wherein a portion of the housing of the flux generator base unit adjacent to the rotor is stepped, defining a plurality of contactless mounting interface apertures adapted to mate with respective receiving units of varying sizes corresponding to the sizes of the plurality of contactless mounting interface apertures.

32. The contactless battery charging/energy transfer apparatus of Claim 21, further comprising a motor control that supplies electrical current to the electrical motor and attempts to maintain a rotational speed of the rotor constant, said motor control monitoring the current supplied to the electrical motor, wherein a wireless communication channel conveying data is effected between the receiving unit and the flux generator base unit by the conditioning circuit pulsing a load applied to the electrical energy output from the conditioning circuit, thereby causing a corresponding pulsing in the electrical current supplied by the motor control to the electric motor in the flux generator base unit, to supply energy to said load, said pulsing of the electrical current being detected as a digital pulse signal conveying the data by the motor control.

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33. A method for charging a battery by inductively coupling a varying magnetic field produced by a base component to a receiver coil disposed in a receiver component, comprising the steps of:

(a) positioning the receiver component proximate to the base component;

(b) generating a magnetic field with a permanent magnet disposed in the base component;

(c) coupling a driving force to an element in the base component so that the element is movable;

(d) moving the element with the driving force to vary the magnetic field produced by the permanent magnet, the varying magnetic field being inductively coupled to the receiver coil, causing a corresponding electrical current to be induced in the receiver coil;

(e) conditioning the electrical current to produce a conditioned current at a voltage suitable for charging a battery; and

(f) charging the battery with the conditioned current.

34. The method of Claim 33, wherein a source of the driving force is disposed remote from where the magnetic field is generated by the permanent magnet and is coupled to the element through a driven shaft.

35. The method of Claim 33, wherein the magnetic field is generated by a plurality of permanent magnets.

36. The method of Claim 33, wherein the element that is moved comprises said permanent magnet.

37. The method of Claim 36, wherein the step of moving the element comprises the step of rotating the permanent magnet to vary a magnetic flux produced by the permanent magnet along a path that includes the receiver coil.

38. The method of Claim 36, wherein the step of moving the element comprises the step of reciprocating the permanent magnet back and forth to vary a magnetic flux along a path that includes the receiver coil.

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39. The method of Claim 33, further comprising the step of enhancing a magnetic flux linkage between magnetic poles of the permanent magnet and the receiver coil.

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40. The method of Claim 39, wherein the step of enhancing the magnetic flux linkage comprises the step of providing a flux linkage bar for coupling a magnetic field from a pole of the permanent magnet into the receiver coil.

41. The method of Claim 33, further comprising the step of selectively varying a maximum magnetic field intensity coupled with the receiver coil.

42. The method of Claim 41, wherein the step of selectively varying the maximum magnetic field intensity comprises the step of varying a position of the permanent magnet relative to the receiver coil to control the magnetic field coupled to the receiver coil.

43. The method of Claim 41, wherein the step of selectively varying the maximum magnetic field intensity comprises the step of changing a speed with which the element moves.

44. The method of Claim 33, wherein the magnetic field is generated with a plurality of permanent magnets.

45. The method of Claim 44, wherein the moving element comprises the plurality of permanent magnets, further comprising the step of moving one of the permanent magnets, and magnetically coupling another of the plurality of permanent magnets to the permanent magnet that is moved, so that the other of the plurality of permanent magnets is moved thereby.

46. The method of Claim 44, wherein the plurality of permanent magnets are fixed relative to the base component, and wherein the step of moving the element comprises the step of intermittently passing a flux shunt member adjacent to pole faces of the plurality of permanent magnets so as to provide a magnetic flux shunt path between the pole faces of the plurality of permanent magnets, to produce the varying magnetic field.

47. The method of Claim 44, wherein the plurality of permanent magnets are moved laterally back and forth past the receiver coil to vary the magnetic field.

48. The method of Claim 44, wherein the plurality of permanent magnets are radially movable on a support that is rotated to produce the varying magnetic field, further comprising the steps of:

(a) forcing the plurality of permanent magnets toward each other when the support is at rest to reduce a startup torque required to begin rotating the support; and

(b) adjusting a separation between the plurality of permanent magnets when the support is rotated, to change a magnitude of the magnetic field coupled to the receiver coil.

49. The method of Claim 41, wherein the step of selectively varying the maximum magnetic field intensity comprises the steps of:

(a) providing a plurality of turns of a conductor wound around said permanent magnet;

(b) causing an electrical current to flow through the plurality of turns of the conductor to selectively adjust a maximum value of the magnetic field produced by said permanent magnet, said electrical current producing a magnetic field that either increases or reduces the magnetic field generated by the permanent magnet.

Sub A6 50. The method of Claim 41, wherein said element is moved sufficiently fast to magnetically couple energy into an air core receiver coil.

51. The method of Claim 41, further comprising the step of providing an indication of whether the receiver component is aligned with the base component.

52. The method of Claim 33, further comprising the step of providing an indication of whether the battery is being charged by the conditioned current.

53. The method of Claim 33, further comprising the step of providing an indication of whether the battery is fully charged.

54. The method of Claim 33, wherein the receiver component is electrically connected to a portable device.

55. The method of Claim 33, wherein the receiver component comprises a portable device.